

INVENTORY CONTROL OPTIMIZATION OF DATANG JUAL BELI (DJB) SHOP AS A STARTUP COMPANY

Jeffy Eugene Anggrianto and Adirizal Nizar
School of Business and Management
Institut Teknologi Bandung, Indonesia
eugene@sbm.itb.ac.id

Abstract – *Internet as one of business means for making money is very popular especially among youngster. Many young people see this opportunity and use it. Although this business need more knowledge about the internet and its relation, but it still attractive. Many executive see “time is money” as their motto which also making internet more attractive since everyone, even busy people can chat, shop, or even just browsing from their seat at home or office. Recently internet business is growing a lot more in Asia including Indonesia where the growth of new online business such as online shopping were very fast expanding. This also become one reason for Datang Jual Beli (DJB) Shop to open an online shop which sell gadget and accessories with brand name Dicapac from Korean Supplier. Currently DJB Shop face some problem related with operational matter namely exceed inventory stock problem and delivery product problem. Since delivery product issue already mitigated, then the focus change to the exceed inventory stock issue. Through this research, it is determined that through Fixed order quantity model with safety stock and optimal order quantity can resulted a lower annual cost. This solution is expected to solve the inventory problem as prioritized one and provide some recommendation to be implemented for better operational improvement*

Keywords : inventory control method, operational, online shop, delivery service

1. Introduction

Online shop as one of the popular means for doing business is keep increasing recently. Although popular, but online business are not free from problem. This research was conduct to observe the problem faced by startup online business and generate the solution as well as recommendation to be implemented in the business mentioned. Datang Jual Beli (DJB) Shop as one of newcomer in online businesses, was first built by Gideon Djauhari as the owner (CEO and COO) of DJB Shop. It was began when Gideon Djauhari see an opportunity to open an online shop when he was browsing the internet and saw Korean company which sell many new, unique and trending gadget products and accessories with competitive price. The product brand name is Dicapac which also was not many in Indonesia. Then he did a market research about certain product demand and their market price in Indonesia. He also calculated the original price which is in Korean Won currency into Indonesian rupiah, and other cost such as delivery cost, custom duties, etc. He found out that there were profit between reasonable selling price and total cost. Then DJB Shop starts to operate on January 2011 with no employee but him that also supported by delivery service from TIKI JNE.

At first DJB Shop sell and distribute Dicapac products from Korean supplier which was done by himself. Overall there are 12 products marketed by DJB Shop. The advertisement was done through some free website such as Kaskus, www.TokoBagus.com, DJB Shop Facebook account, and his own website (www.datangjualbeli.com). Some of the customers also come from word of mouth. But the sales isn't as high as Kaskus website which elaborated as follows :

Table 1. Advertising media sales contribution

NO	ADVERTISING MEDIA	SALES CONTRIBUTION IN PERCENTAGE
1	www.Kaskus.com	51 %
2	www.TokoBagus.com	25 %
3	Word of mouth	17 %
4	DJB Shop Facebook Account	5 %
5	www.datangjualbeli.com	2 %
	TOTAL	100 %

As the time move on the owner begin to recruit until 5 employee to do the operational activity. Unfortunately, due to low experience and knowledge was lead the inventory stock increases less controllable. The delivery product issue also arises which also endanger the company since it was related with customer satisfaction which could lead to decreasing sales. The issue occurred due to delayed product delivery or product defect when arrived in customer hand. But mitigation already done by the owner through internal courier recruiting for serving product delivery inside Jakarta while TIKI JNE handle product delivery outside Jakarta. With this mitigation made the delivery product issue is no longer critical and focus changed to increasing inventory stock problem. The inventory stock handled by employee who also handle the quality inspection for products arrived from supplier. The procedure was run as it should but the inventory record showed the increasing stocks in the warehouse. If this inventory keep increasing could lead to worst scenario, goes bankrupt with a lot of inventory in the warehouse.

2. Business Issue Exploration

According to Chase and Jacobs in a book titled *Operations and Supply Chain Management* chapter 17 related about inventory as follows: *"an inventory should be visualized as stacks of money sitting on forklifts, on shelves, and in trucks and planes while in transit. The inventory is money in the form of goods. Although for many businesses, inventory are the largest asset on the balance sheet at any given time, but it's often not very liquid. That's why it's a good idea to try to get the inventory down as far as possible."* (2011: 592).

That's one reason why inventories should be kept down as possible, the lower the better. Many companies were focused on strategy especially sales and marketing strategy but less consideration and less handling seriousness for this inventory matter. This could resulting less controlled reorder point and ordering quantity that cause the increasing handling cost and maintenance expense. But in this matter, there are some reason of the increasing stock happening. One of them is come from employee's lack experience and knowledge of inventory control. This employee was recruited due to lower salary cost. Lower knowledge and experience mean lower salary cost. But it's also supported by the owner ignorance against this matter which resulting the growing unidentified problem with increasing threat. From 12 products, there are 2 products that have outstanding sales, namely WP-C1 and WP-ONE. And from this fact, the problem solving will be limited to these 2 products.

A. Conceptual Framework

To understand the concept, first we should see that in the business market there are competition which happen also in online business. These competition were using quality, cost efficiency, and good delivery service as their main weapon. Related with this matter, DJB Shop use cost efficiency as their strategy. That's why in order to keep competitive, lower cost should be incurred. Through this

research, a problem related with cost efficiency was identified, namely increasing inventory stock problem. Then a problem analysis was done to find out the root cause of the inventory problem. And how to prevent it in the future through some assessment which done through some calculation and some recommendation such as additional procedure to help monitor the inventory stock.

B. Method of Data Collection and Analysis

The question that came after the problem identification is inventory needed or not. And to answer that question, a deeper interview with the owner has been done and questionnaires which submitted to the owner and employee that handle the inventory control was done to collect information about inventory situation. Related with this, the respondent will be limited to these 2 people. The data collected will be assessed and determined whether the procedure done to control the inventory is sufficient or not.

C. Analysis of Business Situation

Through the submitted questionnaire, a conclusion can be achieved that the manual procedure they performed is currently sufficient due to its small size inventory. But it won't be long until the inventory size increases, then a new method with better automatization or controlling can be applied. Many procedure didn't exist such as inventory record history monitoring and product defect from supplier monitoring. But for safeguard their inventory has been done through CCTV and permit letter. The reality that the owner and inventory control person didn't know any method to calculate the reorder point and optimal order quantity is normally happened in small companies, especially with small size inventory.

3. Business Solution

Through the problem analysis, the root cause has been identified which is supported through personal interview and questionnaire to understand the inventory control situation. And in this section, a business solution alternatives will be discussed and the best applied would be chosen.

A. Alternative of Business Solution

There are several alternatives to solve the increasing inventory stock problem which is through reorder point calculation method that divided into 5 method :

1. The single period model
2. The fixed order quantity model
3. The fixed order quantity model with safety stock
4. The fixed time period model
5. The fixed time period model with safety stock

B. Analysis of Business Solution

Among these 5 inventory control formula models, the most appropriate and fit perfectly is the fixed order quantity model with safety stock model. The single period model formula is definitely didn't fit with this situation since the model can only be applied to one time order instead of continuous order to prevent the stock out. The fixed order quantity model can be applied but since this model assumed that demand was constant and known where almost in every case that demand is not constant but varies from day to day, so the fixed order quantity model with safety stock model is better applied in this case to provide safety stock that should be maintained and prevent stockouts. The fixed time period model with or without safety stock can be applied in this situation but with less effective and less optimize result compared with fixed order quantity model with safety stock since there are no exact time when to order and the customer demand can be changed anytime. So the best applied is the fixed order quantity model with safety stock where there is another additional data provided as a support of this model formula although it's not included in the formula, namely minimal order regulation from the supplier, in this case 10 units.

With the use of fixed order quantity model with safety stock formula, it was expected to solve this increasing inventory stock problem. This model formula was also recommended because of current

inventory control was done manually with no plan and forecasting activity was done only based on the owner intuition and consideration which also resulting in a bigger inventory stock than it should be. The formula of reorder point is as follows :

$$R = \bar{d}L + z\sigma_L$$

Where :

R = Reorder points in units

= Average daily demand

L = Lead time in days (time between placing an order and receiving the items)

z = Number of standard deviation for a specified service probability (z figure was determined based on Chase and Jacobs in a book titled Operations and Supply Chain Management) (2011: 801)

σ_L = Standard deviation of usage during lead time

But to calculate the reorder points the average daily demand should be calculated first which is elaborated as follows :

$$\bar{d} = \frac{\sum_{i=1}^n d_i}{n}$$

Then the standard deviation (σ_L) during lead time will be calculated where the standard deviation on daily basis (σ_d) should be calculated first. The formula is as follows :

$$\sigma_d = \sqrt{\frac{\sum_{i=1}^n (d_i - \bar{d})^2}{n}}$$

$$\sigma_L = \sqrt{L(\sigma_d)^2}$$

Where :

σ_d = Standard deviation of daily demand

d_i = Daily demand of day i

n = working days on that month

Then reorder points were found for each month. With this calculated reorder points, so DJB Shop can better manage their inventory for the next business day. But this is not finish yet since a calculation about how many they should order to reach the optimal Economic Order Quantity (EOQ) which should be calculated also. The EOQ formula will be elaborated as follows :

$$Q_{opt} = \sqrt{\frac{2DS}{H}}$$

Where:

Q_{opt} / EOQ = Optimal Economic Order Quantity

D = Annual demand in units

S = Ordering cost

H = Holding cost

The most difficult element to determine is the holding cost which is taken from percentage from the products cost (COGS). The determination of this percentage figure involve many factors as mentioned by Helen and Richardson in a book titled *Transportation & Distribution* which will be elaborated below (1995) :

- Cost of Money 6% - 12%
- Taxes 2% - 6%
- Insurance 1% - 3%
- Warehouse Expenses 2% - 5%
- Physical Handling 2% - 5%
- Clerical & Inventory Control 3% - 6%
- Obsolescence 6% - 12%
- Deterioration & Pilferage 3% - 6%

Total 25% - 55%

Most of the companies determine 25 % as percentage of COGS although it's varies a lot among many big companies. 25 % also determined for DJB Shop since the business still small which mean smaller cost incurred as well.

After reorder points and optimal order quantity has been calculated, a new inventory policy should be announced, then annual cost should be calculated as a result from these 2 calculation where the formula is as follows :

$$TC = DC + \frac{D}{Q}S + \frac{Q}{2}H$$

Where :

TC = Total annual cost

D = Annual demand

C = Cost per unit

S = Ordering cost

Q = Economic Order Quantity (EOQ)

H = Inventory holding cost

Based on the result, the inventory control is suggested to be supported through inventory turnover ratio and quick ratio. Based on Gitman and Daniel in their book titled The Future of Business, quick ratio can be calculated as follows:

Quick Ratio = (Current Asset – Inventory) / Current Liabilities (2009: 393)

This formula is recommended to be implemented since there are inventory as asset investments inside the formula which deduct the current asset and lowered the quick ratio. The greater inventory will result smaller quick ratio, which mean the company have less liquid money to cover their liabilities and immediate incident that need liquid money, so does the opposite. With this quick ratio formula, the company could make a good balance between the liquid money provided and the inventory investments. And the inventory turnover ratio formula as follows :

Inventory Turnover = Cost of Goods Sold (COGS) / Inventory (2009: 393)

If both of the ratio increased as the time move on, then the problem solution succeeded in decreasing the inventory cost. Another recommendation are as follows :

1. The additional procedure to monitor the inventory record history to know the inventory control progress and the product defect from supplier to know the supplier's delivery performance. Both of these procedures were recommended as well to be implemented since more monitoring meaning more secure and faster action or counteraction.
2. Related with the inventory as well, an additional warehouse was necessary to handle more inventory stock, in this matter the unused garage in the owner's house around 15 square meters which need to be tidy up from dust and unrelated stuff
3. An inventory container are needed to be replaced as well, from carton box into used transparent plastic box for a better appearance and more tidy. Since the box used for inventory container in the warehouse, no need to use the new one.
4. Future research for a better solution since some data collected and analyzed based on assumption instead of real ongoing data.

4. Conclusion and Implementation Plan

According to the business solution, the new calculation method able to give a prediction for the next reorder points and optimal order quantity

Table 2. Saving ratio against COGS

Product	Saving	COGS	Ratio
WP-C1	7,755,000	42,120,000	18.41 %
WP-ONE	7,938,109.76	37,500,000	21.17 %

Table 3. Implementation plan

No	Implementation Plan	Deadline	2	3	4	5	6	7	8
1	Inventory record monitoring procedure	2 February 2013	→						
2	Product defect monitoring procedure	2 February 2013	→						
3	Calculation method	3 February 2013		→					
4	Finish cleaning and tidy up the unused garage	5 February 2013			→				
5	Bought the used transparent plastic box	6 February 2013				→			
6	Moving the inventory stock into these plastic box	8 February 2013						→	
7	Future research for better solution	No determined deadline yet							

which resulting a lower annual cost which is the most demanded result from this research. The saving result of the 2 products mentioned will be shown through table 2. And there are also some recommendation could be implemented for a better performance. The implementation plan will be summarized through Table 3 where future research conducted need more time, therefore the deadline can't be determined. As a conclusion, it is necessary to handle the inventory control seriously even for a small company in order to provide more liquid money for an investments or other business improvements activity.

Reference

- Gitman, L.J, McDaniel C, 2009, *The Future of Business*, Mason USA, South-Western Cengage Learning
- Jacobs, F.R, Chase, R.B, 2011, *Operations and Supply Chain Management*, New York, McGraw-Hill Irwin
- Richardson, Helen, 1995, "Control Your Costs then Cut Them", *Transportation & Distribution*, December, 12: 94